

*A PROCEDURE TO TEACH SELF-CONTROL TO  
CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER*

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This study examined the use of a progressive delay procedure combined with verbal mediation to teach self-control to children with attention deficit disorder. Results showed that when participants were initially given the choice between an immediate smaller reinforcer and a larger delayed reinforcer, all participants chose the smaller reinforcer. When slight delays to obtain a larger reinforcer were instated in conjunction with intervening verbal activity, all participants demonstrated self-control regardless of the content of the verbal activity.

DESCRIPTORS: choice, self-control, impulsivity, delayed reinforcement, children

There are many situations in which a person is asked to select between a small immediate reinforcer and a larger delayed reinforcer of unknown delay duration. Choices for the small immediate option in these situations are termed *impulsive*, and choices for the larger delayed option are termed *self-control* (Logue, Peña-Correal, Rodriguez, & Kabela, 1986).

One method used to reduce the tendency towards impulsive behavior is to gradually increase the delay to the larger reinforcer (Schweitzer & Sultzer-Azaroff, 1988). Another method is to provide the participant with a distracting activity during the delay (Mischel, Ebbesen, & Zeiss, 1972). Dixon et al. (1998) combined these techniques to teach self-control and to increase the intervening activity emitted during the delay.

Adult humans tend to display greater tol-

erance to delayed reinforcers than individuals with less extensive verbal skills, leading some to suggest that developed verbal abilities may be a prerequisite for self-control (Logue et al., 1986). Yet few studies to date have examined whether children who display impulsive behavior can be taught self-control and if verbal skills actually play a role in this type of choice making. In addition, it is not known whether intervening verbal activity must relate to rules that specify the contingencies. Therefore the purpose of the present study was twofold. First, we attempted to reverse the impulsive preferences of children with attention deficit hyperactivity disorder (ADHD) to select delayed reinforcers. Second, we examined the effect of different types of concurrent verbal activities on tolerance to delays using a progressive delay/concurrent activity procedure similar to that of Dixon et al. (1998).

## METHOD

### *Participants, Setting, and Materials*

Three children with ADHD participated in the study due to their frequent difficulty

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attending to tasks in their preschool and home environments. Pierre was a 3-year-old boy who did not receive any medications. Esmerelda was a 4-year-old girl who received Ritalin® (5 mg) daily. Zachariah was a 5-year-old boy who received Ritalin® (5 mg) daily. All experimental sessions were conducted in the participant's preschool. During each session, the child was seated at a table (7 m by 16 m) across from the experimenter in a section of the preschool that was separate from other children and the teachers.

To determine preferred reinforcers for each child, a stimulus preference assessment without replacement was conducted using preferred items identified by teachers and parents. Esmerelda's and Zachariah's most preferred item was a chocolate chip cookie, and Pierre's preferred item was a crispy rice treat. The quantities of these stimuli used were half a cookie or rice treat for the smaller reinforcer and one cookie or rice treat for the larger reinforcer.

### *Procedure*

*Natural baseline.* Two quantities (small and large) of the previously identified preferred item were placed in full view on the table under clear plastic containers, so that the child could not grab them. The child was then asked to choose between the larger or smaller item. Once he or she chose the item, he or she was asked, "please wait as long as you can before eating your treat." Once the child stated they could wait no longer, the experimenter delivered the chosen item, and the session was terminated.

*Choice baseline: Part 1.* Each child was asked to choose between a small immediate item and a large delayed item. The child was instructed, "Do you want [small item] now, or would you like [large item] after waiting for a while?" If the child chose the large item, the experimenter stated to the child, "Since you picked that one, you will need to wait for a while before I can give it to

you." The actual time requirement for access to the large delayed item was three times that of the child's mean natural baseline waiting time. Each session was terminated when the child consumed the large or small item. Four sessions were conducted with each participant.

*Choice baseline: Part 2.* Both small and large quantities of the items were available immediately. Each session began when the experimenter said, "You can have [small item] or [large item] right away. Which one would you like?" After the participant made a choice, the experimenter delivered the item. Each session was terminated when the child consumed the item. Four sessions were conducted with Pierre and Zachariah, and five sessions were conducted with Esmerelda.

*Self-control training.* During each session, the child was asked, "Do you want [small item] now, or would you like [large item] in a little while after we play a game?" If the child selected the small item the experimenter delivered it immediately. However, if the larger item was selected, incremental delays, along with two types of alternating verbal activity, were imposed before the child was able to consume it. Delay values increased every two sessions at a rate of 2 to 3 s. Two conditions with activities during the delay alternated in multielement fashion roughly every second session. The first type of verbal activity involved the child repeating the statement, "If I wait a little longer, I will get the bigger one." The child was asked to repeat this self-stated rule aloud until the experimenter instructed the child to stop. The second type of verbal activity involved the child naming pictures of objects depicted on flash cards. Thirty-eight self-control training sessions were conducted with Pierre, 17 with Esmerelda, and 13 with Zachariah.

*Self-control training variation.* After successful completion of the self-control training phase, a training variation was introduced to more clearly assess differences be-

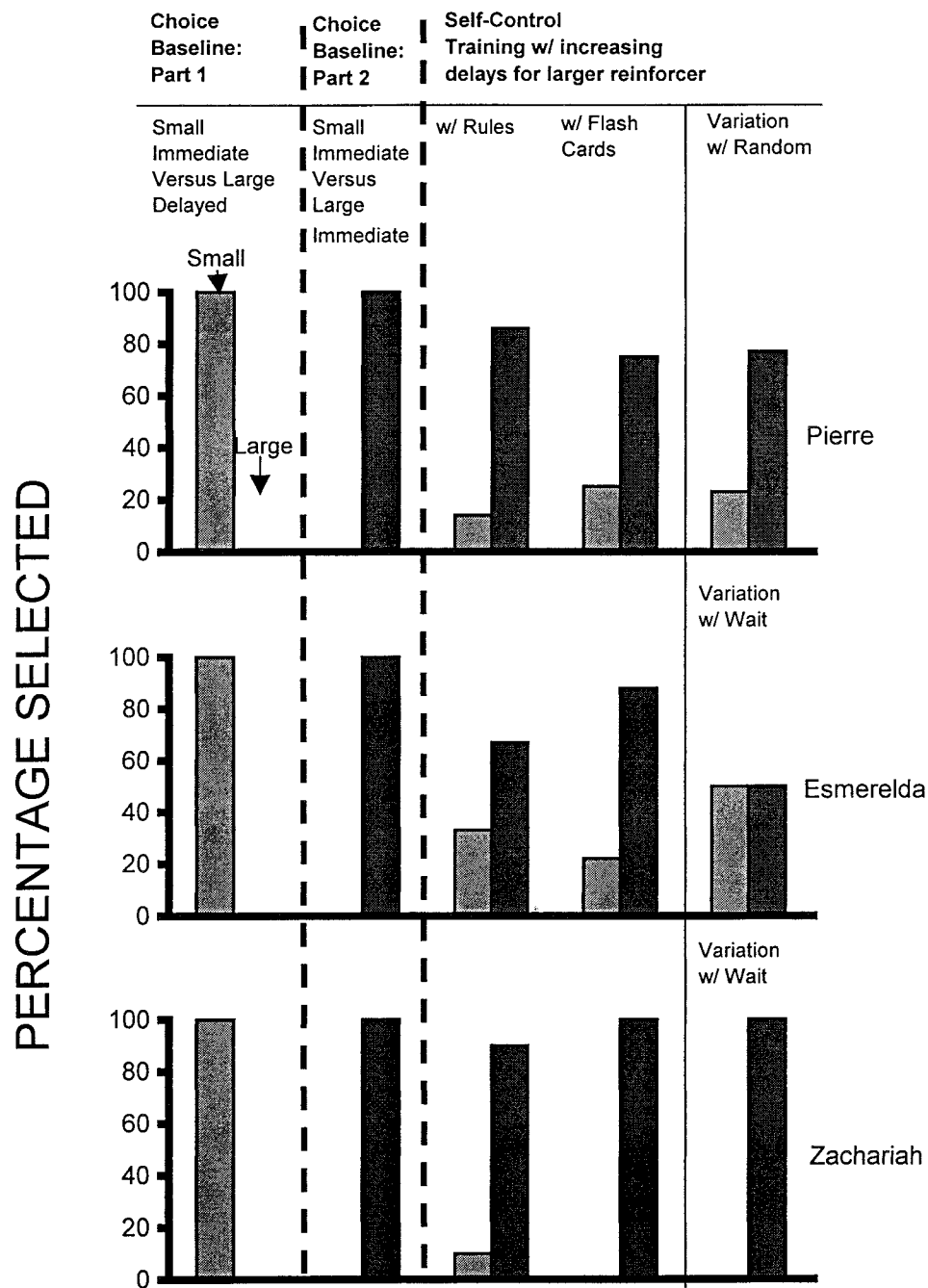


Figure 1. Percentage of choices for each response alternative during natural baseline, choice baseline (Parts 1 and 2), self-control training, and training variation conditions across all participants. The light bars indicate that the smaller immediate reinforcer was chosen, and the dark bars indicate that the larger reinforcer was chosen.

tween the type of concurrent activity during the delay. For Pierre, conditions alternated in a multielement format between sessions with the rule statement and sessions with a random statement ("black table, wobble, green"). For Esmerelda and Zachariah sessions alternated in a multielement format between the rule statement and no response requirement (i.e., the participant simply had to wait).

A second observer was present on 25% of all sessions for all participants. Interobserver agreement was 100% for selection between the large and small item and 100% for the time in seconds that the child waited during the delay ( $\pm 3$  s).

## RESULTS AND DISCUSSION

Mean natural baseline durations for waiting to consume the larger reinforcer were 17 s for Pierre, 5 s for Esmerelda, and 4 s for Zachariah. This resulted in a performance goal of 51 s, 15 s, and 12 s for each participant, respectively. During the choice baseline, all participants selected the small immediate item over the larger delayed item on 100% of their choices (see Figure 1). When conditions were changed such that both consequences were available immediately (choice baseline, Part 2), all participants chose the larger reinforcer 100% of the time. Preference for the larger reinforcer remained high throughout the self-control training conditions regardless of which delay activity occurred (i.e., rule statement or flash-card identification). Preference for the larger delayed reinforcer continued during the training variation in which participants were required to repeat a random phrase (Pierre) or simply wait (Esmerelda and Zachariah). No participant ever chose the larger reinforcer and subsequently failed to engage in the required duration of the target behavior.

These results extend those of Dixon *et al.* (1998), who showed that self-control can be

increased through progressive delays in adult human subjects, to young children with ADHD. The present study also shows that the type of activity that the participants engaged in was not critical to their ability to demonstrate self-control, suggesting that the mere requirement of an intervening activity is as effective as requiring a rule describing the contingencies. Although these findings seem to contradict previous assertions by Logue *et al.* (1986) that young children inevitably display impulsive behavior, it should be noted that methodological differences may account for discrepant findings. In addition, the purpose of the Logue *et al.* study was to evaluate impulsivity rather than to promote self-control.

Because we did not tell the participants how long they would be required to wait to gain access to the larger reinforcer, but rather stated "for a while," participants were required to make a choice for a larger reinforcer of unknown delay. Future research could evaluate indifference points among choices when specific delay values are either described or contacted. Another potential limitation of this study was that it utilized a treatment package that contained (a) a progressive delay to gain access to the larger reinforcer, (b) an activity to be engaged in during the delay, and (c) slight changes in instructions across conditions (i.e., asking the child to "wait for a little while" during the choice baseline, but then asking them to "wait a little while and play a game"). Thus, increases in self-control cannot be attributed solely to one intervention component. Future research should isolate these variables to determine their relative contributions to the emergence of self-control.

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